Design and Use of a Harp Trap for Assessment of Resident Microchiropteran Species and Associated Ectoparasites at Stinking Hole, Dominica

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Abstract

The purpose of this study was to design and build a harp trap for use at Stinking Hole, Dominica. The hypothesis was that the trap would capture the resident bat specimens for ectoparasite collection and morphometric data as they emerged from the cave. This harp trap did not efficiently trap the dominant species, *Monophyllus plethodon*; however, it did function in the collection of resident *Brachyphylla cavernarum*.

Introduction

The harp trap was first invented in 1958 by Constantine using steel piano wires and coil springs to create a plane of vertical parallel lines to stop bats as they struck it. They would then fall into a collection chamber at the bottom of the trap. There were many minor modifications until 1974 when Merlin Tuttle created a harp trap utilizing two harps. The concept behind the double harp design was that bats turn perpendicularly to the ground to pass between the harp strings, but because they cannot maintain this angle of flight they strike the second harp and fall into a collection chamber. There are no known records of harp trap use on Dominica.

There are twelve species of bats native to Dominica. Until this experiment 10 of the 12 species had been captured for study by Texas A&M Study Abroad students. Stinking Hole, known in the local Kweyol as Tou Santi, is a lava tube found at 15°20'N, 61°22'W in St. Paul Parish Dominica. In July 1978 Robert Baker entered the cave and noted a resident colony of *Brachyphylla* (Genoways et al., 2001).

Materials and Methods

Harp trap (Figure 1)

6 m mist net with four shelves

Leather gloves

Calipers

Soft tip forceps

Scintillation vials

Ethanol

The harp trap used in this experiment was one of my own design based upon readings and suggestions by Duane Schlitter (2004). The harp design was based on the suggestion that the strings should be spaced approximately 2.5 cm apart and the harps should be spaced from 7 to 10 centimeters. The remainder of the design was developed based on the use of the United States Standard Measurement System to maximize the use of 10-foot pieces of PVC pipe. The design used _ inch pipe because it is the standard size used to conduct drinking water and therefore is readily available.

Upon purchase of PVC pipe in Dominica, it became apparent that the PVC water pipe imported from Barbados was of a lighter scheduling than that used in the United States. This means the piping is much flimsier. The pieces purchased were also of a metric measurement shorter than 10 feet. It became clear that the design would have to be altered to increase stability and make better use of the shorter pieces of pipe. A copy of the revised plan can be found in Figure 1.

The harp trap was hung between trees along the hiking trail 0.75 meters above ground in a possible flight path 5 meters from Stinking Hole in a primary montane rainforest. A 6 meter, four-shelf mist net was erected approximately 20 meters away from Stinking Hole as a backup in case of trap failure.

The bats began emerging at approximately 6:35 p.m. and were observed striking the harp trap. Most of the bats passed through the trap, and those that did fall into the collection chamber were able to push their way upward through the down-hanging flaps and escape. One specimen of *Monophyllus plethodon* and two specimens of *Brachyphylla cavernarum* were captured using the trap. The mist net captured 17 specimens of *M. plethodon*.

The ectoparasites were removed from the bats using soft tip forceps and placed in scintillation vials of ethanol for storage.

Results

Only bats of the family Phyllostomidae were captured at Stinking Hole and examined for ectoparasites.

Species Characterization:

Monophyllus plethodon

The Lesser Antillean long-tongued bat is endemic to the Lesser Antilles. It is grayish-brown with a long rostrum and long tongue adapted for nectivory. All specimens captured were female. The average mass of the 18 specimens was 13.9 grams with a standard deviation of 1.08 grams. According to Evans and James (1997) it is a tree roosting species with an average wingspan of 320mm. In 2001 it was stated by Genoways et al that "Long-tongued bats have been reported as cave inhabitants on several Antillean islands, but are not among species that have been taken in

caves on Dominica". The ectoparasites collected consisted of 26 unidentified mites, 39 Streblid batflies of the genus *Tricobius*, and one unidentified ectoparasite of either the family Nycteribiidae or the genus *Nycterophilia* in the family Streblidae. *Tricobius* was identified using a key developed by Warriner and Woolley (2001). It should be noted that *Tricobius* was repeatedly observed congregating on the lumbar to sacral region on the dorsal side of *Monophyllus*, and was also observed flying from the host before they could be captured.

Monophyllus plethodon **Descriptive Statistics**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
Mass	13.889	1.079	.254	18	11.000	15.000	0
Forearm	42.000	.998	.235	18	40.500	44.200	0
Foot	9.417	.863	.203	18	8.100	11.000	0
Tragus	2.678	.347	.082	18	1.800	3.200	0
Ear	10.911	.595	.140	18	9.900	11.900	0
Body	59.556	1.748	.412	18	57.500	62.300	0

Brachyphylla cavernarum

The Antillean cave bat is confined to the Caribbean. It is a large grayish-brown frugivorous bat that may also exhibit some nectivorous tendencies. *Brachyphylla* has long been thought to be the dominant resident species in Stinking Hole. This pug-faced bat has an average wingspan of 450mm (Evans and James, 1997). The average mass of the 2 specimens taken was 44 grams. Upon collection of ectoparasites from the two specimens (one male, one female), 5 Streblid flies of the genus *Trichobius* were identified using a key developed by Warriner and Woolley (2001).

Brachyphylla cavernarum **Morphometrics**

Sex:	M	F
Mass:	42.0	46.0
Forearm:	65.8	62.8
Foot:	14.5	14.0
Tragus:	5.2	5.5
Ear:	18.4	16.1
Body:	82.1	86.4

Discussion

It is apparent from the data collected that *Monophyllus plethodon* is a cave roosting species in Dominica which has overtaken Stinking Hole, a site previously dominated by *Brachyphylla cavernarum*. It should be noted that all *M. plethodon* were female, possible indicating that Stinking Hole is used as a nursing colony. While the harp trap used in this study was not effective for collection *of M. plethodon*, it was effective for collection of *B. cavernarum*, and *Molossus molossus* in a test run across the Check Hall River on the Springfield Station. *Monophyllus* may have been able to pass through the harps because it flew with enough momentum to stretch the monofilament lines it did strike. Because *Monophyllus* can fly from a seated position and had the strength to lift the plastic flaps it could escape the collection chamber. Species as large as *Brachyphylla* are too large to escape from the collection chamber because they don't have room to spread their wings for flight. Small species such as *Molossus* could not escape because they cannot take off from a sitting position and do not possess the strength to lift the plastic flaps. This type of trap is useful in the collection of small and large bats because of their size or strength disadvantages; however, bats small enough to fly inside the collection chamber but of adequate strength to lift the plastic flaps are not suitable for collection with this trap.

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Works Cited

Evans, Peter G.H., and Arlington, James 1997. Dominica: Nature Island of the Caribbean. Faygate Printing, Sussex.

Genoways, Hugh H., Robert J. Baker, Carleton J. Phillips, Duane A. Schlitter 2001. Bats of the West Indian Island of Dominica: Natural History Areography, and Trophic Structure. Special Publications, Museum of Texas Tech University.

Schlitter, Duane A. 5/2004. Personal communication.

Instructions for Use of Crocker Bat Trap
By Ashton Crocker, Dominica 2004

1. Unroll 183 cm pieces with attached monofilament line.

2. Insert ends of "H-frame" side supports into openings of couplings attached to 183 cm pieces.

3. Insert nails as pins through predrilled holes to hold side support pipes in openings.

4. Tie 2m long bamboo poles to top of each harp for support.

5. Slide 214cm and 51cm pieces of pipe into collection chamber sleeves of corresponding length.

6. Attach couplings and 30 cm "leg" pieces.

7. Tie grommet flaps to "leg" pieces using string to maintain rectangular shape of collection chamber.

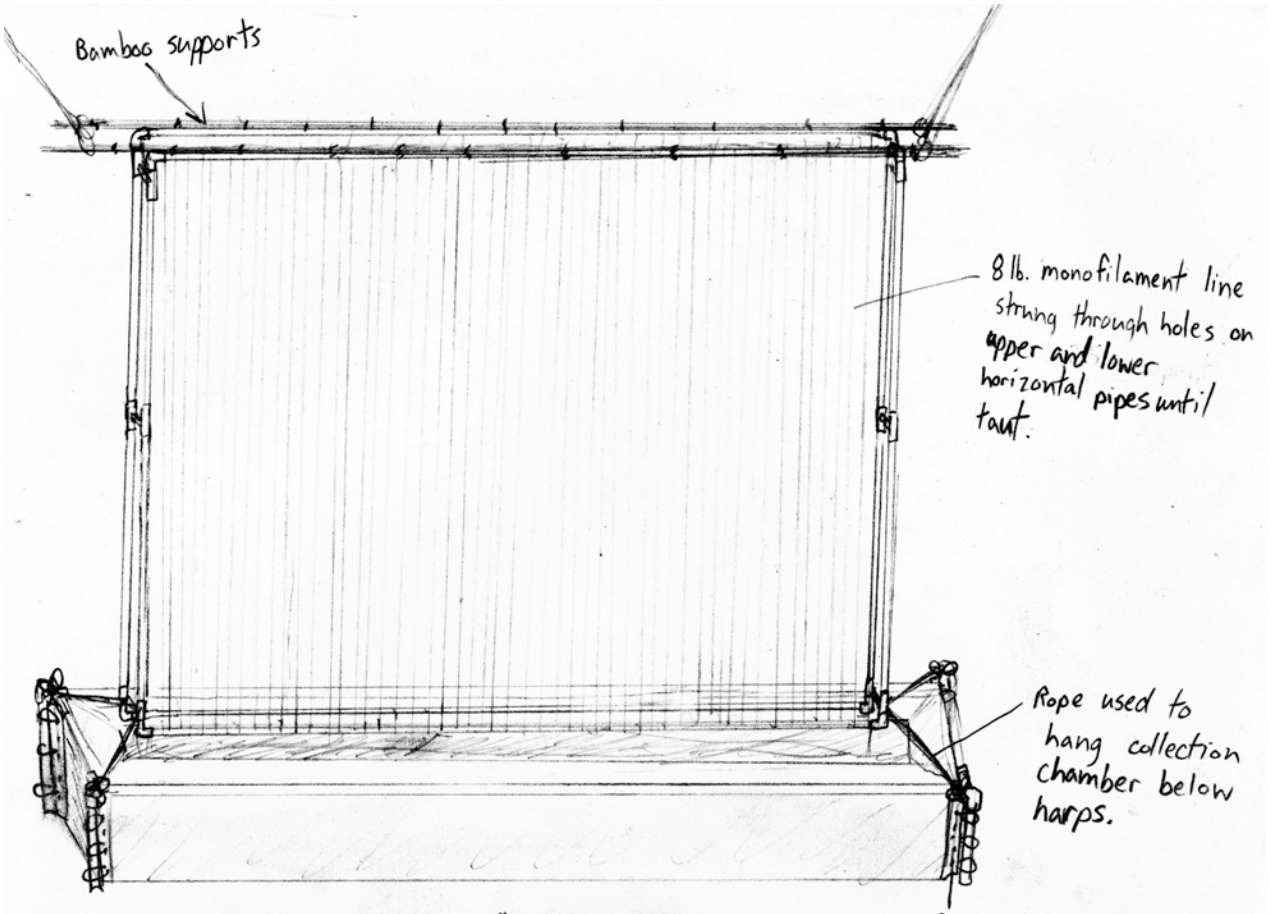
8. Pin plastic sheeting over downward slanting slopes of collection chamber, with approximately 10 extra centimeters that will hang inside the central opening to prevent the escape of climbing bats.

9. Attach a 183cm x 40cm piece of plastic sheeting to the bottom of each harp to prevent bats from flying between the harps and collection chamber.

10. Tie the collection chamber as close as possible to the bottom of the harp assembly.

11. Hang harp trap in flight path.

12. To check collection chamber for bats, shine flashlight inside to reveal silhouettes of any trapped bats.



THE DRIFTER TRAP

Figure 1 a

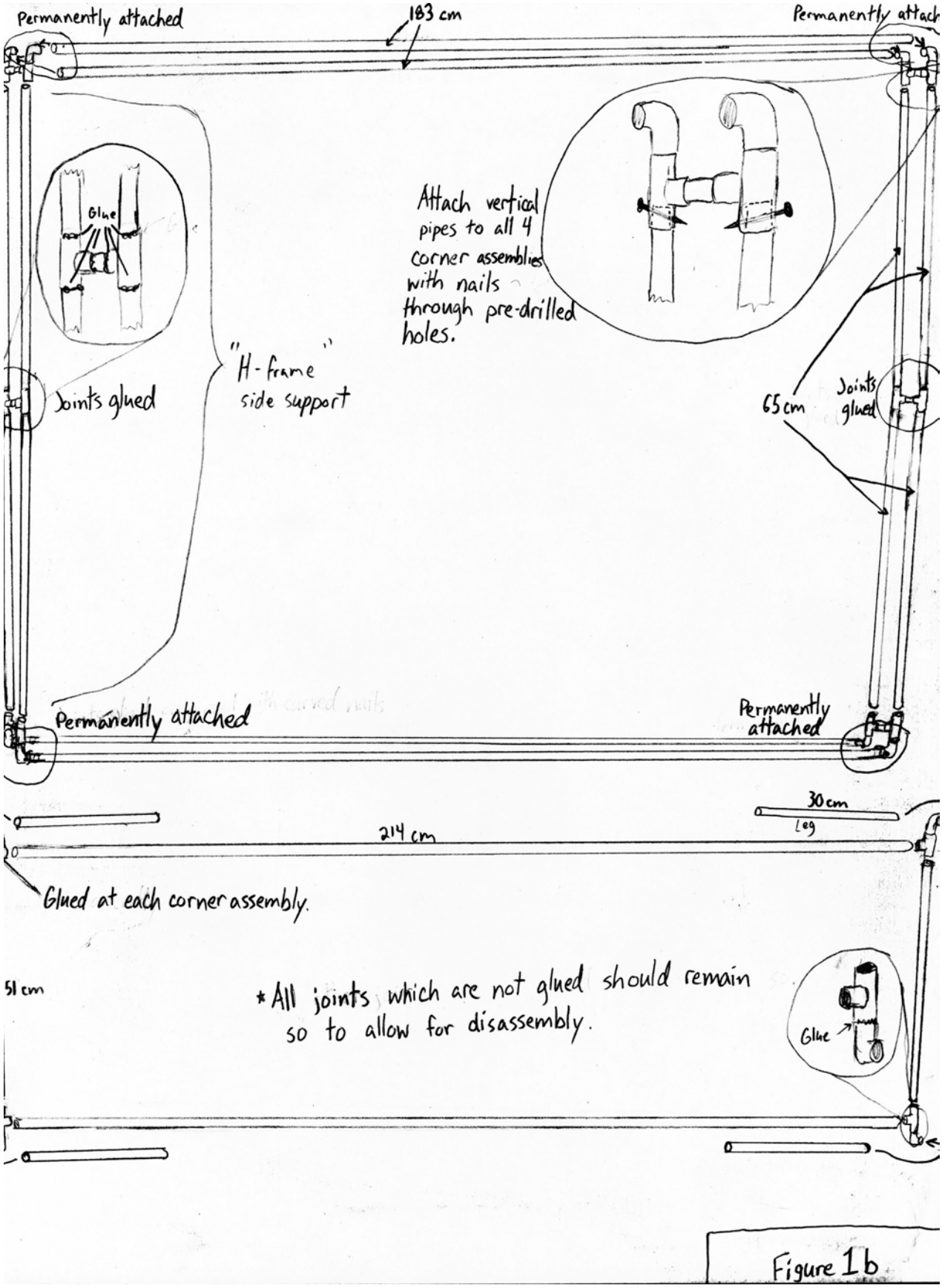

Permanently attached
183 cm
Permanently attach
Glue
Attach vertical pipes to all 4 corner assemblies with nails through pre-drilled holes.
"H-frame" side support
Joints glued
65 cm
Joints glued
Permanently attached
Permanently attached
30 cm
Leg
214 cm
Glued at each corner assembly.
51 cm
* All joints which are not glued should remain so to allow for disassembly.
Glue

Figure 1b